No. 7. — *Notes on Bermudian Fishes.*[1] By Thomas Barbour.

The material which forms the basis for this paper belongs to the Museum of Comparative Zoölogy and is from several sources: first, a collection made by my brother, Mr. W. W. Barbour, and myself during parts of March and April, 1903; secondly, a large and rather complete collection made during part of June, July, and part of August, 1903, while I was attached to the Biological Station at Flatts, Bermuda; thirdly, a number of specimens in the collections of the Museum of Comparative Zoölogy, and finally, a series obtained by Professor Mark and collected at the Station during the summer of 1904. I here express my gratitude to Dr. Mark for his kindness in procuring a number of most interesting specimens, and thank Messrs. H. B. Bigelow, Owen Bryant, and J. T. Nichols, for their kind aid in collecting and preserving the largest collection. Finally, it is a pleasure to thank Mr. Samuel Garman of the Museum for the assistance he has giving me in making the identifications.

Before turning to a systematic consideration of the material in hand, a few words are necessary in explanation of the peculiar faunal conditions which obtain about the Bermuda Islands. In 1872 Dr. G. Brown Goode visited the Bermudas for several weeks (February to March), and made the first collections of any considerable size or value from this locality. He pointed out in his paper on the fishes (Goode '76[a]) the splendid opportunity here presented to the ichthyologist for the study of the effects which the ocean currents have had in providing Bermuda with a fish fauna. He called attention to the fact that almost all the more characteristic fishes of the West Indian regions, and also many fishes which are found in the Azores, Canaries, Madeira, Cape de Verde Islands, and even on the coasts of Southern Europe and Africa are represented in Bermudian waters. One of the most interesting examples of distribution probably due to ocean currents is the occurrence of *Synodus saurus*, a fish which, on account of its sluggish, bottom-loving disposition, one would consider unlikely to range far from home. The majority of the

[1] Contributions from the Bermuda Biological Station for Research. No. 6.

species derived from distant regions, are, as Goode has pointed out, powerful and rapid swimmers. Few of the species which have been described as peculiar to Bermuda have remained so long. Both *Stolephorus choerostomus* and *Siphostoma jonesi* were once believed to be peculiar to Bermuda, but only a year or so ago the U. S. Fish Commission expedition to Porto Rico found both these species there. The Bermuda representatives were in all probability derived from the West Indian region. *Ulaema lefroyi* also is now known from many of the West Indies, and the Florida Keys.

The classic on the general Natural History of the Bermudas is Jones, Wedderburn, and Hurdis ('59); while more recently Verrill (:02) has published a most valuable and interesting volume dealing with the history, scenery, etc., of the island and on the faunistic changes due to man. In (:01) Verrill also published a paper dealing with the fauna; this contains a short article on the fishes. The birds and several groups of invertebrates have been treated in a volume by Jones and Goode ('84). An interesting popular account of the fish markets of Bermuda was published by Goode ('76[b]) in "Forest and Stream." Günther ('79) has listed the species of fishes taken by the naturalists of H. M. S. Challenger near the islands.

In the present paper the notes on distribution are obtained partly from "The Fishes of North and Middle America," by Jordan and Everman, which I have found very valuable in this connection, and partly from specimens in the vast collections of the Museum of Comparative Zoölogy.

LEPTOCARDII.

BRANCHIOSTOMATIDAE.

Branchiostoma caribbaeum Sundeval. The West Indian Lancelet.

Verrill, :01, p. 55.
Goode, '77, p. 293 (*B. lubricum*).

Distribution. — Atlantic coast of North America to Rio Plata.

Found in all localities where the bottom is suitable. Very common on the sandy spit in Flatts Inlet, directly opposite the Hotel Frascati.

Asymmetron lucayanum Andrews. Andrews's Lancelet.

Mark, :04, p. 179.

Distribution. — Bahamas and Bermudas.

Taken in dredgings at a number of localities in different parts of the Bermudas.

PLAGIOSTOMI.

GALEIDAE.

Carcharhinus platyodon (Poey). Puppy Shark.

Verrill, :01, p. 55.

Distribution. — Coasts of Texas and Cuba.

Very common off the Challenger Banks and outside the reefs. Considered a fine food fish by the colored people. The only specimen preserved was identified by Mr. Garman as belonging to this species.

TELEOSTEI.

ANGUILLIDAE.

Anguilla chrisypa Raf. Eel.

A. bostoniensis (Le Sueur) Ayres. Goode, '76[a], p. 71.

Distribution. — Atlantic coast (ascending rivers); West Indies.

Said to be common in ditches in Devonshire Marshes. The specimens, seven in number, were all obtained in mud-holes near the mangrove swamp at Hungry Bay. I found four there in April, 1903, and three in July, 1903. The largest specimen was about 4 inches in length. The only water connection of this swamp was directly with the ocean, and as no eels have ever been taken off the shores of Bermuda, it puzzles me to know how such young eels got into the mangrove swamp. The Devonshire Marshes, so far as I could learn, have no connection with the ocean; the water there is only slightly brackish.

MURAENIDAE.

Lycodontis moringa (Cuv.) Spotted Moray.

Gymnothorax moringa (Cuv.) Goode. Goode, '76[a], p. 72.

Distribution. — West Indies; North coast of South America; St. Helena.

This species with the larger *L. funebris* (Ranzani) was quite common about all the reefs, particularly off the south shore, where many are taken by fishing from the rocks. The specimen before me was taken during the "Challenger Bank Expedition" — a three-days trip provided by Captain Meyer, of St. George's, for the members of the Biological Station about the first of August, 1903. The flesh is eaten by the negroes, who say that it is sugary-sweet, and very tender; I heard nothing of its being considered poisonous.

L. sanctae-helenae (Günther).

Distribution. — Tropical Atlantic; St. Helena.

A single example taken in 1904; compared with the preceding this species is rather rare.

OPHICHTHYIDAE.

Sphagebranchus anguiformis (Peters).

Distribution. — West Indian region.

A single example of this rare species was dredged in shallow water by Professor Mark on Aug. 6., 1904, at Station No. 468. It is without spots and is 5½ inches long. The head is contained 18 times in the length of the body. A second specimen of this species, which I may mention in this connection, was dredged by Messrs. G. M. Allen, Owen Bryant and myself while on our Northern Bahama Expedition in July, 1904. It is far larger, being of the same proportions and 12½ inches long. It was dredged in 14 fms. in Whale Cay Channel off the Island of Abaco, Bahamas.

ALBULIDAE.

Albula vulpes (Linné). Bone fish.

Distribution. — Tropical seas, almost universally distributed.

D. 15; A. 8.

The species is rare at Bermuda; I have examined only a single specimen taken there. (M. C. Z. No. 18,088.)

CLUPEIDAE.

Sardinella anchovia Cuv. & Val. Anchovy.

Goode, '76[a], p. 69.

Distribution. — West Indies, N. Coast of South America.

D. 16; A. 16.

Large schools of this clupeoid were seined regularly in Hamilton Harbor and Flatts Inlet for bait. They appeared to run up into shoal water at about sunrise or sundown.

S. macrophthalma (Ranzani). Pilchard.

Harengula macrophthalma (Ranzani). Goode, '76[a], p. 69.

Distribution. — West Indies, coast of Brazil.

D. 17; A. 18. Sc. 40; 12.

We took only two specimens of this species. Mr. H. B. Bigelow and myself each took one about 11 o'clock one very warm evening in August in Flatts Inlet on a hook baited with strips of *Bathystoma*. A dark lantern turned toward the water showed a considerable number of what appeared to be the same species swimming about; no more were seen afterward. They are said to be rather common in winter.

Opisthonema oglinum (Le Sueur). Herring.

O. thrissa (L.) Goode, '76[a], p. 69.

Distribution. — West Indies, common on coasts of Florida, Georgia, and the Carolinas, occasionally much farther northward.

D. 19; A. 24.

I have about 100 specimens of this common tropical herring, varying in size from one to five inches. They appeared erratically in great schools.

ENGRAULIDAE.

Stolephorus choerostomus (Goode). Hog-mouth Fry.

Engraulis choerostomus Goode. Goode, '74, p. 380; and '76[1], p. 70.
Jordan & Evermann, '96–00, vol. 1 (1896), p. 444.

Distribution. — Bermuda and Porto Rico.

D. 13 or 14; A. 23.

This species was not at all common during July, but in August immense quantities were seined for bait in Bailey's Bay and Flatts Inlet.

SYNODONTIDAE.

Synodus saurus (Linné). Snake fish.

S. lacerta (Valenciennes) Goode. Goode, '76[1], p. 68.
Jordan & Evermann, '96–00, vol. 1 (1896), p. 537.

Distribution. — Atlantic coast of Southern Europe; Bermuda.

D. 12; A. 12.

One of the two specimens taken jumped into a rowboat at Flatts Inlet; they frequently rise three feet from the water in the upward dash after their prey. The second specimen was taken from the fish pot of a Portuguese at Cooper's Island by Messrs. Nichols and Bryant.

We had many opportunities to watch their habits as they lay on the white shell and coral sand in the Flatts Inlet. They changed color remarkably and mimicked their surroundings very closely indeed. They would wait until their food, usually a small fish, was directly over them, and then rise with great speed, and seize it from below.

ESOCIDAE.

Tylosurus raphidoma (Ranzani).

Distribution. — West Indies; coasts of Florida and Brazil.

D. 23; A. 22.

This species has not, I believe, been found at Bermuda before. One small specimen ($4\frac{1}{2}$″ lg.) was taken with a fine seine in Flatts Inlet. It showed none of the silvery coloring of the adults, but was covered with stellate chromatophores.

T. acus (Lacépède). Hound.

Distribution. — West Indies, occasionally northward and in the Mediterranean Sea.

D. 23; A. 21.

This species was present in great numbers in most of the inlets and bays about the islands. We obtained a number of specimens on hooks baited with *Sardinella* or *Stolephorus*. These fishes play havoc with the useful bait fishes, killing numbers which they do not eat. They all contained parasitic worms in the trunk musculature.

HEMIRAMPHIDAE.

Hyporhamphus unifasciatus (Ranzani). Needle fish, Gar fish.

Distribution. — Southern Florida, Panama, and Brazil.

D. 12; A. 15.

Specimens were taken with seine at low tide in the Flatts Inlet. They were quite common, but did not appear as regularly or in as large numbers as did *Tylosurus acus*.

Hemiramphus brasiliensis (Linné).

H. pleii (Cuv. & Val.) Goode. Goode, '76[a], p. 64.

Distribution. — The West Indian region.

D. 14; A. 12.

One badly damaged specimen, apparently of this species, is in the collection of the M. C. Z. No. 8,774, taken by Captain Hamilton at Bermuda about 1870.

EXOCOETIDAE.

Exonautes esiliens (Müller). Flying fish.

Exocoetus exiliens Gmelin. Goode, '76[a], p. 64.

Distribution. — Pelagic.

D. 12–13; A. 12; P. 18; V. 6; C. 21.

One young specimen of what appears to be this species was taken from *Sargassum* off the Challenger Banks and thirteen young examples were taken in the tow net, July 7, at 9 p. m., wind east, in Flatts Inlet. No adult flying-fishes were seen close to shore at any time, and only very few inside the outer reefs. Hundreds of flying fishes, however, were seen from the steamer from forty to sixty miles off shore.

FISTULARIIDAE.

Fistularia tabacaria Linné.

Goode, '76[a], p. 27.

Fistularia serrata Goode, '76[a], p. 75.

Distribution. — West Indies, straying northward.

D. 14; A. 13.

One specimen of this curious species was taken by Mr. L. Mowbray off St. George's and was kindly obtained from him by Prof. E. L. Mark for examination.

SYNGNATHIDAE.

Siphostoma jonesi (Günther).

Jordan & Evermann, '96–00, vol. 1 (1896), p. 768.
Syngnathus jonesi Günther, '74, p. 455. Goode, '76[a], p. 27.

Distribution. — Bermuda and Porto Rico.

Mr. O. Bryant obtained a single specimen of this species under a rock at Hungry Bay; and a second specimen has recently been handed me by Professor Mark; it was taken during July, 1904.

S. pelagicum (Osbeck).

Syngnathus pelagicus Osbeck. Goode, 76[a], p. 27.

Distribution. — Tropical Atlantic and Mediterranean.

About a dozen specimens were obtained in *Sargassum* and by the dredge in from 6–12 fm. Several very large specimens were taken during July, 1904.

S. mackayi Swain & Meek.

Distribution. — S. Florida to Yucatan.

One small specimen was taken from the dredge in Castle Harbor. This is the first time the species has been reported from Bermuda.

S. dendriticum, sp. nov.

(Plate 1.)

Type, (M. C. Z. No. 29,057) a single specimen dredged in about 7 fms. off Ireland Island, Bermudas, July, 1904.

Rings 14 + 39. Dorsal 16, just over vent on rings 1–4.

Snout about twice in distance to base of pectoral. Tail longer than body. Anal fin vestigial; composed of two rays on ring 2. Color brown with irregular blotches and darker marblings. A number of peculiar filamentous appendages; many of these have probably been torn off, as this specimen was taken in the dredge with a considerable mass of broken *Oculina*, etc. The largest pair of these appendages is situated just above and behind the orbits. The next largest pair is on the nape, just anterior to the branchial aperture. Pairs of filaments are situated irregularly along the dorsal and ventral surfaces. On the segments of the trunk rings are peculiar radiating striae; and a raised boss marks the centre of each segment. On the tail rings the bosses are very conspicuous and the ornamental striae less so.

HIPPOCAMPIDAE.

Hippocampus sp. Sea Horse.

One exceedingly small specimen taken in the tow-net off Flatts Inlet one night during July. I have been unable to determine the species. Sea-horses are well known to the natives, and are said to be common at certains seasons.

ATHERINIDAE.

Menidia notata (Mitchill).

Distribution. — Coast of United States southward to the Carolinas.

D. 6+9; A. 1, 23.

There is one specimen of this species in the collection of the M. C. Z. (No. 18,246); so far as I can ascertain no other specimen has ever been taken.

M. menidia (Linné). Blue Fry.

Distribution. — Atlantic coast of United States, the Carolinas southward.

D. 4+9; A. 1+22.

This species was exceedingly common in Flatts Inlet. Thousands were seined daily by the natives for bait.

MUGILIDAE.

Mugil brasiliensis Agassiz. Mullet.

M. liza Cuv. & Val. Goode, '76[a], p. 63.

Distribution. — West Indies; Atlantic coast of South America.

D. 5+8; A. 3+8.

Specimens were frequently taken from the seine in Flatts Inlet; the species is generally common.

M. curema Cuv. & Val.

Distribution. — Both coasts of the Americas.

D. 5+5; A. 3+9.

I obtained a large number of specimens of this species in March and April, 1903, at Hungry Bay. During the summer, however, only one specimen was taken; this was from *Sargassum* floating off Ireland Island. The species has not been taken before at Bermuda.

SPHYRAENIDAE.

Sphyraena sphyraena (Linné.)

S. spet (Haüy) Goode, '76[a], p. 61.
Jordan & Evermann, '96-00, vol. 1 (1896), p. 826.

Distribution. — Southern coast of Europe to Bermuda.

D. 6+9; A. 1+9.

This European species is not uncommon about Bermuda. I have a single specimen about 10 inches long taken in the seine near Gibbet Island and another, considerably smaller, taken by the members of the Biological Station during the summer of 1904.

HOLOCENTRIDAE.

Holocentrus ascensionis (Osbeck). Squirrel.

Holocentrum sogo Bloch. Goode, '76[a], p. 49.

Distribution. — Florida and Cuba to St. Helena.

D. 11 + 15 ; A. 6 + 10.

This species is very common in sheltered nooks about the rocky shores and reefs. It is nocturnal and great numbers were sometimes taken in a few hours at night in the fish pots.

H. puncticulatus, sp. nov.

(Plate 2.)

D. 11 + 13 ; A. 4 + 8 ; ll. 45; ltr. 3 + 8.

Near *H. siccifer* Cope, but differing in the number of rays in the anal fin, in the shape of the dorsal fins, and in color.

Head with spines $2\frac{1}{2}$, depth $2\frac{3}{4}$. Spinous dorsal rather long and elevated anteriorly ; soft dorsal not as high as spinous portion. Second anal spine and first anal soft ray about the same length and almost reaching the base of the caudal. There is one strong spine on the preopercular bone and one on the opercular. The posterior and ventral edges of both these bones are strongly serrate. The interorbital keels are rather weak, and each divides posteriorly into nine, spreading out in a fan-like manner.

The color in life is bright rosy red with nine lateral series of very fine black and dark brown dots ; growing fainter and fewer ventrally. A large black spot appears on the membrane of the first three dorsal spines, and also on the spines themselves. The rest of the fins are rosy white, except for a few extremely faint dusky patches on the posterior part of the first dorsal.

This species is represented by the single type specimen (M. C. Z. No. 29,054), Flatts Inlet, Bermuda Is. Taken in a fish trap in about 10 ft. of water. The species is rather common, and other specimens were seen.

MULLIDAE.

Upeneus maculatus (Bloch). Goat fish.

Hypeneus maculatus (Bloch) Cuv. Goode, '76[a], p. 49.

Distribution. — West Indian region.

D. 8 + 8 ; A. 2 + 6.

Probably common in rather deep water outside the reef. One specimen was taken in a fish pot off Hungry Bay by a fisherman, who said that the species was not uncommon, and another from the stomach of a large grouper (*Epinephelus striatus*).

CARANGIDAE.

Decapterus punctatus (Agassiz). Robin.

Goode, '76 , p. 46.

Distribution. — Mass. to Brazil.

D. 3 + 30 (31); D. 3 + 25. Sc. 40 about.

I have four specimens, two taken by Dr. A. S. Bickmore (M. C. Z. No. 17,054), and two taken in Harrington Sound in July, 1903. This species is common at times, but it is at other times quite impossible to find a single specimen. They take bait best at night in moderately deep water.

Seriola zonata (Mitchill). Crevalle.

Goode, '76[1], p. 75.

Distribution. — Massachusetts to the Carolinas.

D. 8 + 38; A. 3 + 21.

One specimen taken on the Challenger Banks. I saw quite a number of these brought in by the Hamilton fishermen. They were usually taken far off shore.

Trachurops crumenophthalmus (Bloch). Goggle-eye.

Goode, '76[1] p. 47.

Distribution. — Coast of Atlantic Ocean (except Europe). Pacific off Central America and Mexico.

D. 8 + 26; A. 3 + 22. Sc. 36.

One specimen about two inches long was taken from *Sargassum* off the Challenger Banks and turned over to me by Professor Mark. The species was very rare at Bermuda all summer. A slightly smaller specimen was taken during July, 1904.

Caranx ruber (Bloch).

Distribution. — West Indies.

D. 8 + 27; A. 2 + 23. Sc. 30.

One specimen taken in the tide rush at mouth of Harrington Sound on hook baited with *Stolephorus*. A second specimen (M. C. Z. 17,360) was taken at Bermuda in 1864 by Capt. Hamilton. This specimen has 31 scutes on the caudal pedicel.

C. hippos (Linné).

Distribution. — Tropical seas.

D. 8 + 21; A. 2 + 17. Sc. 30.

One specimen taken on hook and line in Flatts Inlet in about four feet of water and two specimens from Hamilton (M. C. Z. No. 28,989) are the only representatives of this widely distributed species which I have had an opportunity to examine from Bermuda.

C. crysos (Mitchill). Jack.

Goode, **76**[1], p. 75.
Paratractus pisquetus (C. & V.) Gill. Goode, **76**[1], p. 47.

Distribution. — Massachusetts to Brazil.
D. 8 + 25 ; A. 2 + 21. Sc. 45.

I have examined four specimens of this species from Bermuda; three were taken in the summer of 1903 at Flatts Inlet, the other at Hamilton about 1870 (M. C. Z. No. 17338). A number of these fishes were almost always to be found lying in wait for fry carried out of Harrington Sound by the tide. They took bait voraciously and afforded considerable sport for their size. We took none over 9 inches in length. The name Jack is applied to several species.

NOMEIDAE.

Nomeus gronovii (Gmelin).

Jordan & Evermann, **'96-00**, vol. 1 (1896), p. 949.

Distribution. — Tropical Atlantic.
D. 11 + 26 ; A. 3 + 26.

This species appears to be rather common in Castle Harbor, where the only specimens seen were taken. They usually swim about among the tentacles of the Portuguese-man-o-war, but the only specimen I caught was swimming lazily along near the surface of the water ; there were, however, plenty of *Physaliae* near by.

CORYPHAENIDAE.

Coryphaena equisetis (Linné). Dolphin.

Distribution. — Open Atlantic, most common in the tropics.
D. 52 ; A. 25.

A single specimen taken off Bermuda during the summer of 1904. It was said to be very common at all times at some distance off shore.

CHEILODIPTERIDAE.

Apogon binotata (Poey).

Distribution. — Florida, West Indies, and Brazil.
D. 7 + 8; A. 2 + 8.

A single specimen of this species was taken in Castle Harbor, it appears to be rare. Several natives to whom I showed the specimen declared that they had never seen it before. I compared it with Poey's type from Cuba (M. C. Z. No. 8,750) and could find no difference between them.

A. maculata (Poey).

Distribution. — Cuba.
D. 4 + 10; A. 2 + 7; ll. 27, ltr. 2 + 10.

I have five specimens of this handsome species. Three of these were taken in Flatts Inlet; I took one in July, 1903, and Mr. Nichols two in August. The remaining two came from some floating *Sargassum*; one on the Challenger Banks, the other near the main island; both specimens are very small. I was told that the species became very common in Flatts Inlet about the latter half of August.

SERRANIDAE.

Bodianus fulvus (Linné). Nigger fish.

Jordan & Evermann, '96-00, vol. 1 (1896), p. 1144.

Distribution.—West Indies.

This species appears to be very generally distributed over the reefs, and moderately common everywhere.

Epinephelus striatus (Bloch). Grouper, Hamlet.

Goode, '76[a], p. 57.

Distribution. — West Indies to Brazil.

D. 9 + 17; A. 3 + 8.

The most important food fish taken near Bermuda. My specimens are small ones taken in fish pots near Flatts Inlet. It attains a weight of 40 pounds.

E. maculosus (Cuv. & Val.). Hind.

Jordan & Evermann, '96-00, vol. 1 (1896), p. 1158.
E. gutattus (Gmelin) Goode. Goode, '76[a] p. 58.

Distribution. — The West Indies generally.

D. 9 + 16; A. 3 + 8.

This species was very common everywhere about the reefs. We took specimens by the hook up to 15 or 16 inches in length near North Rock, where they were especially common. Their power of changing color is highly developed; for they change from almost uniform ruddy to flaming red spotted regularly with deep brown or black.

E. morio (Cuv. & Val.). Red Hamlet.

Distribution. — Southern Atlantic coast of North America southward to Brazil.

D. 9 + 16; A. 3 + 9.

This species was generally taken with *E. striatus*, but was far more rare than that species. It is said to be growing more common year by year.

Mycteroperca venenosa apua (Bloch). Rock-fish.

Trisotropis undulosus (Cuv.) Gill. Goode, '76[a], p. 55.

Distribution. — West Indies, Florida Keys to Brazil.

Grows to a great size and is one of the most important of the common food fishes.

Hypoplectrus puella Cuv. & Val. Mutton Hamlet.

Goode, '76[a], p. 60.

Distribution. — West Indies.

D. 10 + 14; A. 3 + 7.

Not uncommon about rocky shores with very steep banks; but locally distributed. Six specimens were taken in fish pots in Harrington Sound near the bridge and off the dock of the Hotel Frascati.

Paranthias furcifer (Cuv. & Val.). Barber.

Distribution. — Both coasts of Tropical America.

D. 9 + 18; A. 3 + 9.

This species has not been previously recorded from Bermuda. Mr. J. T. Nichols took three specimens, each about 1 foot long, off the south shore near Hungry Bay with hook and line. Two were also among the collection made in July, 1904. The color of all was a dull uniform rose pink.

LUTIANIDAE.

Neomaenis griseus (Linné). Gray snapper.

Lutjanus caxis (Schn.) Poey. Goode, '76[a], p. 54.

Distribution. — West Indies, South Atlantic coast of United States to Brazil.

D. 10 + 14; A. 3 + 8; ll. 51; ltr. 7 + 13.

One of the most common Bermudian fishes; large schools could be seen swimming about in Harrington Sound or Flatts Inlet at any time. About 50 of them spent most of their time under our boat at her moorings, never seemed to be more than a few yards from this location. They are shy and extremely difficult to take. The specimens before me are from Harrington Sound. They appear less shy in Hamilton Harbor, where many are taken on hooks and in fish pots for bait.

N. apodus (Walbaum). Schoolmaster.

Distribution.—West Indies; Florida to Brazil.

D. 10 + 14; A. 3 + 8.

Several specimens taken from both Hungry Bay and Harrington Sound. The young were common in many small coves along this shore, and large specimens are often taken about the outer reefs.

N. vivanus (Cuv. & Val.). Silk snapper.

Distribution. — West Indies.

D. 10 + 14; A. 3 + 8.

A very common species in the deeper water about the outer reefs and in the middle of Harrington Sound. I have several specimens taken with a fish pot in the steamboat channel about opposite Bailey's Bay. This species takes bait well, especially at night, and affords fair sport.

N. hastingsi Bean. Spot snapper.

Bean, '98, p. 45.

Distribution. — The Bermudas.

D. 10 + 14; A. 3 + 8.

One specimen of this species was turned over to me by Prof. E. L. Mark; it was taken on the Challenger Banks. Dr. Bean states that this is the "silk snapper" of the native fishermen; but so far as I could ascertain from numerous inquiries, that name is only used for *N. vivanus* (C. & V.).

Ocyurus chrysurus (Bloch). Yellow tail.

Goode, '76[a], p. 55.

Distribution. — West Indies to Brazil.

D. 10 + 13; A. 3 + 9; ll. 66; ltr. 7 + 16.

This species was very common in Harrington Sound, where large numbers were sometimes taken using "scuttle" (*Octopus rugosus*) for bait. My specimens are from fish pots in Flatts Inlet and Harrington Sound. The species attains a weight of 5 lbs.

HAEMULIDAE.

Haemulon macrostomum Günther. Sow grunt.

Distribution.—West Indies generally.

D. 12 + 16; S. 3 + 8.

This species was frequently brought into Hamilton by the fishermen, who took it in rather deep water near the outer reefs, usually in company with *Haemulon album*.

H. carbonarium Poey. Bull grunt.

Jordan & Evermann, '96-00, vol. 2 (1898), p. 1300.

Distribution. — West Indies.

D. 12 + 16; A. 3 + 8.

This fish was not at all uncommon off the South shore; it was rarely taken anywhere else. We have several specimens from about one mile south of the mouth of Hungry Bay.

H. sciurus (Shaw). Striped grunt.

Distribution. — West Indies generally.

This fish was taken occasionally in fish pots off the South shore and in Hamilton Harbor. It did not appear to be nearly as common as *H. flavolineatum*. There are two specimens (M. C. Z. No. 10,555) which were taken in 1862 by Dr. Bickmore.

H. flavolineatum (Desmarest). Yellow grunt.

Jordan & Evermann, '96-00, vol. 2 (1898), p. 1306.

Distribution. — West Indies.

This species is very common everywhere about Bermuda. There are thirty-four specimens in the Museum which were taken by Dr. A. S. Bickmore in September, 1862 (M. C. Z. Nos. 10,526, 10,541). It does not usually grow to a size suitable for food. A large number were taken during August, 1903, in Harrington Sound.

Orthopristis chrysopterus (Linné). Sailor's choice.

Distribution. — Atlantic and Gulf coasts of the United States.

D. 13 + 16; A. 3 + 12.

This species was quite common in Hamilton Harbor, though I never saw a single example elsewhere in the Bermudas.

Bathystoma striatum (Linné).

Jordan & Evermann, '96-00, vol. 2 (1898), p. 1310.

Distribution. — Bermudas to South America.

D. 13 + 13; A. + 37.

Common, particularly in Flatts Inlet, where it may be taken any day usually associated with very large numbers of *B. rimator*. There are twenty specimens (M. C. Z. No. 10,602) which were taken by Dr. Bickmore in 1862.

B. rimator (Jordan & Swain). White grunt.

Distribution. — East coast of United States and West Indies.

D. 13 + 15; A. 3 + 8.

An excessively common species in Flatts Inlet, less so elsewhere. I have specimens taken in a fish trap in Harrington Sound and Flatts Inlet; any number could have been collected.

SPARIDAE.

Calamus calamus (Cuv. & Val.). Porgy.

C. megacephalus (Swainson) Poey. Goode, '76[a], p. 51.
C. orbitarius Poey. Goode, 76[a], p. 51.

Distribution. — West Indies and Florida.

D. 12 + 12; A. 3 + 10.

The fishermen recognize two "Porgies": the "Goat head," and the "Sheep head." I think, however, that both species are referable to *C. calamus*, for they did not seem to be very certain as to just what constituted a "Goat head" or "Sheep head" porgy.

Diplodus sargus (Linné). Bream.

Jordan & Evermann, '96-00, vol. 2 (1898), 1363.
Sargus variegatus (Lacépède), Goode. Goode, '76[a], p. 52.

Distribution. — Coast of Southern Europe, westward to Bermuda.
D. 12 + 13 (14); A. 3 + 13 (14).
One of the commonest shoal water species. It was strangely confused with *Kyphosus sectatrix* by Goode.

GERRIDAE.

Eucinostomus gula (Cuv. & Val.). Shad.

Goode, '76[a], p. 39.

Distribution. — New York (rarely) to Brazil.
D. 9 + 10; A. 3 + 8.
Common, generally associated in small schools with the young of *Neomaenis griseus* and *Mugil brasiliensis*.

KYPHOSIDAE.

Kyphosus sectatrix (Linné). Chub.

Pimelepterus boscii (Lacépède). Goode, '76, p. 52.

Distribution. — Pelagic in North Atlantic; West Indies.
D. 11 + 12; A. 3 + 11.
This species may be called an irregular, though usually very common, visitor at Bermuda.

POMACENTRIDAE.

Abudefduf saxatilis (Linné). Cow pilot. Sergeant major.

Glyphidodon saxatilis (Linné) Cuvier. Goode, '76[a], p. 38.

Distribution. — Both coasts of Tropical America.
D. 8 + 13; A. 2 + 12; ll. 28; ltr. 11 + 5.
I have about twenty specimens of this species varying in length from a half inch to four inches, the latter being a large one for the shores of Bermuda. I saw a very large specimen in a rock pool at North Rock. Native fishermen state that the species attains a weight of one and one half pounds in the deep water off the Rock. It is very common everywhere.

Furcaria cyanea Poey.

Distribution. — Cuba.
D. 12 + 12; S. 2 + 12.
A single specimen from Bermuda taken in 1864 by Captain Hamilton (M. C. Z. No. 14,801). I can find no other record for the occurrence of this species except off Cuba.

Microspathodon chrysurus (Cuv. & Val.).

Distribution. — West Indies.

Two very small specimens from *Sargassum* off Ireland Island. The species does not appear in previous lists, so far as I am aware.

Eupomacentrus leucostictus (Müller & Troschel). Cock-eye pilot.

Distribution. — West Indies; Florida.

D. 12 + 15; A. 2 + 13.

Although with considerable hesitation, I refer to this species a number of Pomacentroids which were taken in various localities, about the Islands. The genus is in a very confused condition, and I have no desire to describe these specimens as new until a more extensive examination of existing material can be made.

E. fuscus (Cuv. & Val.). Brown cock-eye pilot.

Verrill, :01, p. 56.

Distribution. — Florida to Brazil; West Indies.

Specimens which may be this species are very common in many localities especially at the head of Hungry Bay, both among the loose rocks of the Spit and among the roots of the mangroves.

LABRIDAE.

Lachnolaimus maximus (Walbaum). Hog fish.

Jordan & Evermann, '96-00, vol. 2 (1898), p. 1579.
L. falatus (L.). Goode, '76[a], p. 36.

Distribution. — West Indies.

D. 14 + 11; A. 3 + 10.

An important and common food fish, growing to the size of about twenty pounds.

Iridio radiatus (Linné). Lady fish. Blue fish.

Jordan & Evermann, '96-00, vol. 2 (1898), p. 1590.
Choerojulis radiatus (L.) Goode. Goode, '76[a], p. 35.

Distribution. — West Indies; Florida to Brazil: St. Paul's rocks.

Not uncommon a short distance off the South shore.

I. cyanocephalus (Bloch). Blue head.

Distribution. — West Indies to Brazil.

Rather rare; the few which we have were taken on the reef off the south shore. This is the most northerly record for the species.

I. garnoti (Cuv. & Val.).

Distribution. — West Indies.

One small specimen obtained in Castle Harbor. The species has not been recorded from Bermuda before.

I. bivittatus (Bloch). Slippery Dick.

Platyglossus bivittatus Bloch. Goode, '76[a], p. 75. Garman, :00, p. 510.

Distribution. — West Indies; Carolinas to Brazil.

D. 9 + 11; A. 3 + 12.

Very common everywhere.

Chlorichthys nitidissimus (Goode). Slippery Dick.

Jordan & Evermann, '96–00, vol. 2 (1898), p. 1608.

Distribution. — The Bermudas.

Rather common about the outer reefs.

SCARIDAE.

Sparisoma abildgaardi (Bloch).

Distribution. — West Indies to Brazil.

D. 9 + 10; A. 2 + 9.

This and the three following species are all called Parrot fishes. I have a single specimen of this species taken in a fish pot off the south shore. It does not appear to have been recorded from so far north before.

S. viride (Bonnaterre).

Distribution. — West Indies.

D. 9 + 10; A. 2 + 9.

A single specimen, which was taken with the preceding species, is the only one we obtained. The natives consider it very rare.

Scarus croicensis (Bloch).

Pseudoscarus sanctae-crucis Günther. Goode, '76[a], p. 75.

Distribution. — West Indies generally.

D. 9 + 10; A. 2 + 9.

Not uncommon in Castle Harbor and occasional in Flatts Inlet. There are several specimens taken from both localities in the collection made in the summer of 1903.

S. caeruleus (Bloch).

Pseudoscarus caeruleus (Bloch) Günther. Goode, '76[a], p. 33.
P. psittacus Goode, '76, p. 75.

Distribution. — West Indies, on our coast, rare.

D. 9 + 10; A. 2 + 9.

Not uncommon.

CHAETODONTIDAE.

Chaetodon ocellatus (Bloch). Butterfly fish.

Distribution. — Cuba; Gulf Stream northward.

Rather rare about the outer reefs; but said by the fishermen to be increasing rapidly in numbers.

C. capistratus (Linné). Four eyes.

Goode, '76[a], p. 75.

Sarothrodus bimaculatus (Bloch) Poey. Goode, '76[a], p. 43.

Distribution. — West Indies.

D. 12 + 19; A. 3 + 17.

Common in many localities about Hamilton Harbor, Harrington Sound, and Castle Harbor.

Angelichthys ciliaris (Linné). Angel fish.

Holacanthus ciliaris (Linné) Lacépède. Goode, '76[a], p. 43.

Distribution. — West Indies and Florida.

D. 14 + 21; A. 3 + 21.

An important food fish, very common about the reefs and steep shores. For some reason the specimens taken off the north shore are considered much more palatable than those taken off the south shore.

TEUTHIDIDAE.

Teuthis hepatus (Linné). Blue tang.

Acanthurus chirurgus (Bloch.) Schn. Goode, 76[a], p. 42.

Distribution. — The West Indian region.

D. 9 + 24; A. 3 + 22.

A few specimens were obtained, but the species did not appear to be as common as the following, with which it was almost always associated.

T. bahianus (Castelnau). Doctor fish.

Distribution. — West Indies; both coasts of Tropical America.

D. 9 + 25; A. 3 + 23.

Decidedly abundant about the reefs and steep shores. Though the adults did not run up into Flatts Inlet, the young were frequently seen there.

T. helioides, sp. nov. Yellow doctor.

(Plate 3.)

D. 9 + 26; A. 3 + 26.

Most nearly related to *T. chrysosoma* (Bleeker) from the Sea of Kajeli. Form ovate; height of body rather more than one half of total length (caudal fin included). The profile of the snout is slightly concave. There are five

incisors on each side of the upper jaw. The upper lobe of the caudal fin is slightly longer than the lower. The scales of the body are very minute. In life the color was brillant yellow, which has changed in spirits to a dull lustreless yellow. The dorsal, anal, and ventral fins are edged with dusky brown, almost black in some places. There is a diffuse patch of light brown on the operculum.

Type (M. C. Z. No. 29,053) a single specimen five inches long taken near Cooper's Island, in Castle Sound, Bermudas, by Messrs. O. Bryant and J. T. Nichols.

BALISTIDAE.

Balistes carolinensis Gmelin. Turbot.

B. capriscus Gmelin. Goode, '76[a], p. 25.

Distribution. — Tropical Atlantic, Mediterranean Sea.

D. 3 + 27; A. 25.

We took several specimens in fish pots in about five fathoms off Flatts Inlet, and I have also one very small one from *Sargassum* of the Challenger Banks given me by Mr. J. T. Nichols. The species grows to considerable size and is frequently eaten, although the flesh is dry and tasteless.

B. vetula Linné. Queen turbot.

Goode, '76[a], p. 26.

Distribution. — West Indian region generally.

D. 3 + 29; A. 27.

Not taken by Goode, but nevertheless rather common. A regular visitant at Bermuda, as several are taken every year. The specimen before me was brought into the Biological Station during the summer of 1904.

MONACANTHIDAE.

Alutera scripta (Osbeck).

Goode, '76[a], p. 26.

Distribution. — Tropical seas of both hemispheres.

D. 1 + 47; A. 51.

A single specimen of this species was speared at Bermuda during the summer of 1904 and obtained by Professor Mark.

TETRAODONTIDAE.

Spheroides spengleri (Bloch). Puffer.

Chilichthys spengleri (Bloch).

Goode, '76[a], p. 22.

Distribution. — Eastern Atlantic.

D. 7; A. 6.

One specimen from Hungry Bay, two inches long, taken by Mr. Nichols and one specimen from the dredge, one inch long, among the reefs off Ireland Island in 8–10 fms. This species did not appear to be at all common and no adults were seen. While collecting invertebrates Mr. Bigelow and I both saw several large "puffers" which appeared to be *S. testudineus*, and I have no doubt that this species will occur in future collections.

SCORPAENIDAE.

Scorpaena agassizii Goode & Bean.

Goode & Bean, '96, p. 247.

Distribution. — West Indian region.

One specimen dredged on the Challenger Bank, by the members of the Biological Station, in forty fathoms.

CEPHALACANTHIDAE.

Cephalacanthus volitans (Linné).

Distribution.—Tropical Atlantic, widely distributed.

D. 2 + 4 + 8; A. 6.

One specimen was taken on the beach at Gibbet Island on June 19, 1903. The species is very rare at Bermuda, and was not known to any of the fishermen that saw the specimen. I learned, however, from Mr. F. Goodwin Gosling, Secy. of the Bermuda Natural History Society, that one specimen had been taken during the spring in Hamilton Harbor.

CALLIONYMIDAE.

Callionymus bermudarum, sp. nov.

D. 3 + 7; A. 4.

Most nearly related to *C. pauciradiatus* Gill; but differing in the number of rays in the second dorsal and in the preopercular spine. Besides giving the radial formula for his specimen (D. 3, 6; A. 3), Gill ('65, p. 144) says: —

"The preopercular spine is armed with three teeth above and terminates behind in an acute point."

A description of the three specimens from Bermuda follows: —

Head (to tip of opercular spine) $3\frac{1}{2}$ times in total length; depth 8 times. Ventral surface of body flat; without a bordering fold of skin; a single lateral line; diameter of eye a little less than length of snout. The maxillary reaches about $\frac{1}{2}$ the distance to the eye. The preopercular spine is armed with two barbs directed forward and situated dorsally; there is also a sharp termination to the spine itself, which is directed straight backward. The gill opening is a very minute slit, also directed backward. In one specimen the first dorsal ray reaches the base of the caudal; each of the other two being successively a little

shorter. In the other two specimens the length of the dorsal is about equal to the distance from the posterior border of the eye to the tip of the snout. The pectoral fins are about as long as the head; the ventrals slightly shorter. The color of these specimens is a milky white, irregularly banded and blotched with light brown. In the largest one (with the filamentous dorsal) the anal fin is rather dark brown and there is a dark spot on the ventral fin and on the middle of the throat, nearly covering it.

Type series, three specimens (M. C. Z. No. 29,055) $1\frac{1}{4}''$, $1''$, $\frac{3}{4}''$, lg. from Bermuda. Taken by the dredge in from 6–8 fms.; Aug. 1903, the largest off Castle Island, the others off Ireland Island.

GOBIIDAE.

Gobius stigmaturus Goode & Bean.

Garman, :00, p. 510.

Distribution. — Bermuda.

D. 4 + 12 ; A. 12.

One specimen from Hungry Bay was taken from under a stone at low tide in about four inches of water by my brother, Mr. W. W. Barbour, April, 1903; a diligent search in the same and similar localities failed to yield a second specimen.

G. soporator Cuv. & Val. Molly miller.

Goode, '76[a], p. 75.

Distribution. — The West Indian region and Northern South America.

D. 6 + 10; A. 1 + 7.

The forty-eight specimens before me show a decided differentiation into two distinct color phases. One lot, consisting of twenty-six specimens, was taken by me, with the aid of Messrs. Bigelow and Cole, in the rock pools of the south shore near Hungry Bay. All these specimens, except two, which are quite black, are very dark brown. The rest, some twenty or more, were taken by dredging in Castle Harbor and Mangrove Bay, in localities where the bottom was white sand composed of coral, shell, and Foraminifera. All these specimens are light gray, almost white, with a row of dark lateral puncticulations, just visible.

This species is very active and jumps about on the bare rocks washed by the waves and even moves from one tide pool to another over dry land.

BLENNIIDAE.

Labrisomus nuchipinnis (Quoy & Gaim.). Molly miller.

Labrosomus nuchipinnis (Quoy & Gaim.) Poey. Goode, '76[a], p. 28.

Distribution. — West Indies and coast of Southern States.

D. 18 + 12; A. 2 + 17.

I collected four specimens of this species in March, 1903, all of a characteristic mottled brown color. In July, 1903, I took eight more, four of which

showed the same color as those taken in the early spring. The others were gorgeously bright with yellow, red, and orange about the foreparts of their bodies. These were all males, the darker ones being females with eggs almost ready to hatch.

I had an opportunity to watch a pair of these fishes getting ready to lay. The female would move swiftly about in the sand under a protecting rock, thus scooping out a hollow place in which she probably deposited her eggs. In a few days the female, looking thinner, lay quite still near the hollow in the sand, where I presume the eggs had been laid; the male was swimming nervously about as if to drive away intruders. Up to the time I left, more than a month after the probable laying of the eggs, the male, with the same gaudy color, was still swimming about; the female was gone, and I presume the young had been hatched and had long since departed.

Salariichthys textilis (Quoy & Gaim.). Molly miller.

Salarias textilis, Quoy & Gaim. Goode, '76[a], p. 29.

Distribution. — Bermudas to Northern South America.

Very common in tide pools about the shores and at North Rock.

BROTULIDAE.

Brosmophysis verrillii Garman.

Garman, :00, p. 511.

Distribution. — Bermuda.

D. 71; A. 52; ll. 98; ltr. 25.

Several specimens of this little known Brotuloid were taken by Mr. H. B. Bigelow and myself from the rock pools near Flatts Inlet and Gibbet Island. A diligent search at Bailey's Bay, the type locality, and in many other likely places failed to reveal a single specimen.

PLEURONECTIDAE.

Platophrys lunatus (Linné). Plate fish.

Distribution. — West Indies generally.

Apparently the only flat fish which is common about Bermuda. Several were taken during my stay in the summer. The only specimen which I had an opportunity to observe carefully was one loaned to Professor Mark by Mr. L. Mowbray of St. George's.

ANTENNARIIDAE.

Pterophryne gibba (Mitchill). Mouse fish.

Distribution. — West Indies generally.

D. 3 + 12; A. 7.

Very common in the *Sargassum*. I have about sixty specimens, a few of which were taken from the dredge off Ireland Island.

P. ranina Tiles.

Distribution. — Fields of sea weed in the Tropical Atlantic, Richardson.

A single large pediculate was obtained from a colored fisherman and handed to me by Professor Mark. It is evidently Cuvier's *Chironectis laevigatus* and also agrees remarkably well with Richardson's (**'44–48**, p. 15, pl. 9, Fig. 354), *Chironectis pictus* var. *vittatus.*

Antennarius stellifer, sp. nov.

(Plate 4.)

D. 3 + 12; A. 7; V. 5; P. 10; C. 9.

Closely related to *A. nuttingii* Garman; but differing conspicuously in coloration, size, and form of bait.

In form this species is short and extremely bulky anteriorly. The caudal peduncle is short and compressed. The head is as wide as high; with a rather deep, scaleless concavity behind the second dorsal ray. The mouth is very wide, almost vertical, and the eye is small. The first dorsal ray is extremely long and slender, a little more than $2\frac{1}{2}$ times the length of the second dorsal ray. On the posterior surface of the second dorsal ray there is a peculiar fringe of elongate scales, a tuft of similar scales being situated on each side of the naked occipital depression. The base of the first dorsal ray is a prominent movable pedicel. The second dorsal ray is quite free, while the third is connected with the dorsum by the skin. The soft dorsal is composed of two regions; the anterior five rays are of equal size and their tips do not extend beyond the connecting membrane. The condition in the posterior part of the fin is very different; the rays do project beyond the membrane, and from the sixth to eighth ray the height of the fin increases regularly, while from the ninth to twelfth the decrease is as regular, so that the posterior portion is more or less fan-shaped. The bait on the tip of the first dorsal ray is a tiny sphere, from which spring numerous delicate filaments.

The color of this species, described from the alcoholic specimen, is as follows: — The entire body is very dark brown, almost black with areas of deep velvety black, which are sometimes surrounded in a zone of lighter brown. The bait, posterior surface of second dorsal ray and under surface of the pectoral and ventral fins is dirty white. There is on each side of the body an irregularly stellate figure of white composed of a central patch and radiating spots. A white saddle is situated on the caudal peduncle.

Only one specimen known, the type (M. C. Z., No. 29,056), obtained in Castle Harbor by Mr. L. Mowbray of St. George's, and procured from him by Professor Mark.

A. scaber (Cuv.)

Distribution. — West Indian waters.

A single specimen from Bermuda was obtained in exchange from the Boston Society of Natural History. It had been in the collection for some time.

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